

Increasing local salience of climate change: The un-tapped impact of the media-science interface

Abstract

The media play a vital role in framing the narrative on climate change, however little work exists to assess the extent to which local media outlets increase public engagement on climate change through interaction and engagement with local academics. As temperatures rise and concerns mount that we have passed the tipping point, local media play a potentially critical role in communicating how climate change exacerbates their impact. Based on a review of extant literature on this topic, and a small pilot email survey, this article argues that scientists could be more active in increasing local salience of climate change by building trusted relationships with local media. Coverage of science in the media could benefit from closer engagement with local scientists as environmental stories often get more coverage in local media (compared to national media) which constitute an important source of knowledge on climate change. This would enable constructive discussions between local media and scientists, better translation of science to publics, increased awareness and interest of science production locally, and ultimately creating a trusted intermediary in the science-public interface.

Keywords: local media; local scientists; climate change communication; public engagement

1. Localising climate change

Climate change is often experienced as a distant and abstract threat and visualization, frames and narratives that individuals can connect with at a local level can increase salience of the issue, have powerful resonance and ‘create a common base for learning and dialogue’ (Howarth, 2017: 301; Scannell & Gifford, 2013). However, environmental news tends to be low down media agendas competing with topics such as crime, terrorism and celebrity news. Indeed, environmental issues attract scant coverage in mainstream US news coverage (print and television) (PIEC, 2015, Kalhoefer, 2017), and taken as a whole, they make up just 1% of headlines (PIEC, 2014). However, news stories with strong visuals and a human-interest angle, such as families or local businesses affected by flooding, propel climate change into the headlines (Sheppard et al., 2015). An analysis of 10 UK regional newspapers found that over a quarter of climate change articles focused either on local impacts or local responses (Brown et al., 2011). People’s sense of identity tends to be closely tied to place where local media can have a particularly important role (Devine-Wright, 2013; Van Vuuren et al., 2014). As Lester and Cottle observe in their study of international television coverage of climate change:

“Stories that localize the global crisis of climate change are common in television news. Visuals are often grounded in a particular place and honed in on loss of life, and in so doing, private loss is revealed, the threat becomes a domestic one, and viewers in their own homes are invited to care” (2009: 927)

A combination of ‘direct experience, vicarious experience (e.g. news media stories) and social construction’ affects perceptions and experience of climate change at the local level (Akerlof et al., 2013:81). Indeed, extreme weather incidents can also act as ‘focusing’ events making it easier for people to imagine future scenarios and, as climate attribution science becomes more sophisticated, weather forecasters will soon be able to identify the role of climate change on specific events (Schiermeier, 2018). Whilst some research suggests that ‘proximising climate change does not directly increase relevant individual action’ (Brügger et al., 2016: 134), and projections of climate change at the local level can be subject to uncertainties, we argue that nonetheless local engagement of climate change continues to play an important role in increasing salience and connection to the issue. Indeed, a survey into people’s attitudes to climate change following the 2013 UK floods found those affected were significantly more likely to be concerned about climate change than those that were not directly impacted (Capstick et al., 2015). Participants who were most directly affected by floods were twice as likely to mention climate change (among the top 3 most important issues facing the country) than were people in the nationally representative sample.

Local meteorologists are extremely well-placed in communicating climate science (see Bloodhart et al., 2015; Zhao et al., 2014; Maibach, 2016; Sherman-Morris, 2005). American adults tend to watch local TV weather news approximately once a day in order to check conditions for making plans and deciding

on what clothing to wear (see Bloodhart et al., 2015). In 2010, George Mason University, Climate Central, and WLTX-TV pilot-tested Climate Matters, a series of short on-air (and online) segments about the regional impacts of climate change, delivered by the TV station's principal meteorologist. One year on, evaluations showed that viewers had developed a more science-based understanding of climate change compared with those of other local news stations. A study by Bloodhart et al. (2015) suggests that individuals who trust their local TV weathercaster as a source of information about climate change, and identify as politically conservative or moderate, are most likely to be influenced. By 2016 over 300 weathercasters at 202 TV stations across the US were taking part in the Climate Matters initiative. This approach is proving highly successful and shows the value of building closer relationships between scientists and local media and could be rolled out more widely beyond the US context. However, a 2018 survey of members of the Society of Environmental Journalists found that in spite of interest in professional development activities related to climate change reporting, there are considerable barriers impeding them from covering local climate change stories, including cutbacks in their organizations (Maibach, 2018; Maibach et al., 2018).

2. Local science-media interaction on climate change

The media play a vital role in framing climate change, however little work has been undertaken to assess the extent to which local media outlets increase public engagement on climate change (Anderson, 2009, 2014; Schäfer & Schlichting, 2014). As the President of the Society of Environmental Journalists observed: "Climate coverage at local news organizations is critical to the public's understanding of how the changing climate affects them, where they live, and how they can adapt" (SEJ, 2018). Environmental stories often get more coverage in local compared to national media (Anderson, 2014; PIEC, 2014) and local media constitute an important source of knowledge, particularly among older age groups, with TV news being the most accessed offline source of news and one of the most trusted media sources (European Broadcasting Union, 2018; Newman et al., 2017; Reuters Digital News Report 2017; Shuckburgh et al. 2012). However, some evidence suggests that levels of trust in social media have declined due to concerns about fake news and misinformation (see European Broadcasting Union, 2018; Tobitt, 2018). A 2018 YouGov poll in the UK found that three times as many people claimed they trusted local newspapers compared with social media (YouGov, 2018). While the share of people accessing local TV news for information has fallen in the United States it still represents the largest audience among the three major platforms of cable, network and local (see Matsa, 2018). Americans are also more likely to say they trust local as opposed to national media (Statistica, 2018).

Decisions on climate change tend to take place at the local level (Porter et al., 2014) however science and evidence is often framed at the regional and international levels. Evidence on the science, impacts and responses to climate change is therefore misaligned with needs at the local level (Howarth and Painter, 2016) which creates a gap for local media to fill. Much previous research has focused on the elite national press coverage of climate change (see Anderson, 2009, for a review), but the regional or local media have been neglected. However, it is not an easy task to define what is meant by 'local media'; this differs widely between different countries and some national newspapers have sections for local news (see Brown et al., 2011). It should also be noted that over recent years many regional media outlets in Europe and the USA are in decline as they face fierce competition from digital sources and rely heavily on PR copy (Anderson, 2014; Nielsen, 2015).

Scientists are expected to communicate their findings effectively to undertake public engagement activities and maximize the impact to society, yet they often lack basic training and support in order to do so (Jacobs et al., 2017). An Ipsos Mori poll revealed that 90% of the British public considers scientists to be highly trustworthy yet 40% consider scientists to be poor at communicating and 50% consider scientists to be secretive (Castell et al., 2014). Whilst academics are encouraged to engage with media through their university press offices, this is mainly by contributing to press releases and responding to media enquiries. The culture of the academic system promotes journal article publications and research income generation and rarely acknowledges the importance of demonstrating the impact of science via public engagement activities and the media. Whilst this is valued, it is difficult to achieve for those who are time poor and lack appropriate media engagement and communication skills. Research and public engagement rarely are equally funded under the same funding programme, and public engagement activities are often funded through separate funding streams, such as the UK Natural Environment Research Council's 'Engagement Environments' fund, with a lesser focus on research. When it comes to media engagement, scientists often lack incentives,

confidence and the required skills, and perceive public engagement activities to be time and resource intensive. Engaging with the public still tends to be seen as an add-on activity rather than integral to the research from the design stage at the very beginning.

Organizations and universities worldwide are increasingly investing in improving the skills and confidence of scientists to better communicate to non-scientists and more effectively engage with the media. Initiatives such as Climate Communication, the UN Intergovernmental Panel on Climate Change, the International Center for Journalists, The Conversation, Carbon Brief, to name a few, serve to build on past challenges and produce meaningful and engaging processes of climate communication (Wihbey & Ward, 2016). Organizations such as the UK Carbon Brief and the Energy and Climate Intelligence Unit provide rapid response mechanisms through briefings on complex aspects of climate and related sustainability topics, often working with scientists or translating complex scientific outputs for non-academics. These build on the specialist communication and science writing skills of their staff which would be of huge benefit to scientists in becoming better at communicating their science and engaging with the public.

In the UK, the Concordat for Engaging the Public with Research (RCUK, 2010) recognizes the important role scientists have in engaging the public on complex issues (such as climate change) and outlines, in its third principle, the availability of training, support and opportunities. In spite of these efforts, there remains a gap in terms of training and capacity building for scientists to engage with the media. Whilst the skills and confidence to undertake these activities are important, a (academic) system in which scientists have the time and resources to do so currently does not align with the needs of effective science communication, this is true not just in the UK but internationally.

A focus on communication skills is central to engagement with the media and public and should thus feature at a very early stage in scientists' careers and be carried out regularly ensuring a long term cultural shift. With this in mind, and acknowledging the growing 'impact' agenda, it is fundamental that scientists are fully trained in media and public engagement throughout their career. For example, through knowledge exchange partnerships, and shadowing journalists. Time and resources must be made available in order to support scientists in these capacity building activities and to enable them to develop and implement media and public engagement activities, benefitting the academic, her/his research and their institution. There is a significant opportunity for academics to gain more coverage in local media particularly given increasing reliance on agency material, staff cuts, and loss of expertise (ComRes, 2014). Likewise, science/environment journalists could benefit from the competitive opportunity to learn more about the work of scientists through fellowships such as the Reuters Institute scheme at the University of Oxford in the UK. Whilst this may not be possible for most regional reporters who are covering environmental affairs there could still be occasional workshops involving university press offices and local scientists designed to improve the quality and depth of reporting.

Public engagement on climate change and empowerment to act increases when conversations are held at a local level (Devine-Wright, 2013), yet this kind of engagement is sparsely reported. Mechanisms for increasing discussions on climate change amongst the public are most effective when 'the perceived ability to discuss climate change (self-efficacy) and the perception that discussions about climate change could create positive impacts (response efficacy)' (Geiger et al., 2017: 112). In addition, when it comes to media-science engagement, 'the reach, impact and role of local media are often overlooked by universities and scientists' (Howarth and Black, 2015: 507). Engaging in constructive dialogue between scientists and local media outlets would lead to a number of benefits: increased salience of climate change and clarity on science processes, a better incorporation of the local context in science, a better understanding of how scientists and media work, improved communication skills and trusted relationships between scientists, the media and public (Howarth and Black, 2015).

3. Forging stronger local science-media collaboration

3.1. Role of local media and local scientists

We surveyed a small group of general scientists (GS), climate scientists (CS), local journalists (LJ), press officers (PO) and online media organizations (OM) in the South East and South West of England, UK, to ascertain their views on the most effective way forward to increase local salience of climate change through local science-media interactions (see supplementary file). The interviewees all saw

local media outlets as playing a potentially instrumental role in reporting the science of climate change. For example, it was stated that they “*could play a key role in raising awareness of the relevance of climate science risk management*” (CS1) and an important part in terms of reporting “*what the local impacts/implications are likely to be and how local businesses, politicians, etc. are responding*” (OM1). Local media and journalists are known at the local level and hence provide a window into local knowledge and understanding of how issues such as climate change may be affecting local areas, potentially improving levels of engagement. In the view of one scientist:

“The local media motivates a switch from communicating ‘matters of fact’ to initiating discussions around ‘matters of concern’ [1]. – everyday frames and filters that help push scientists into thinking about what global and regional climate changes will mean at the local level. Media campaigns around community-based issues are a potentially important platform to bring home the anticipated realities of environmental changes in the immediate future.” (GS1). [1] Note this refers to the distinction Latour (2004) makes.

Whilst the role of local media in communicating science was widely acknowledged, the climate scientists and general scientists raised issues around the ability of local journalists to accurately translate complex science and acknowledge inherent ambiguity and ambivalence. For example, one scientist observed: “*The competence of local media to adequately frame issues is highly questionable*” (GS2). Selecting scientists who are credible in their field in order to fact-check an article or provide a comment on the underpinning science was seen as key but potentially problematic, as local journalists and editors may not necessarily understand who holds what expertise at the local level, nor may they have the time and resources to find this out. This concern over the quality of regional media coverage may lead local scientists to avoid reaching out to these outlets thereby contributing to a vicious cycle of lack of expertise on which to base or consult for local reporting. Local media were seen to have a lack of specialist expertise in climate change issues, tending to be predominantly Arts graduates and generalist reporters themselves and thereby lacking general knowledge of scientific issues, an appreciation of the scientific process, and understanding of what constitutes good science. However, at the same time this is also the case for national media outlets, with the exception of some weather forecasters, and a dwindling number of science/environment specialists (many of whom do not come from a science background) (Anderson, 2014). Building trust in individual relationships between journalists and scientists was nonetheless seen to be crucial. One scientist commented that local scientists need to: “*put in the effort to meet local practitioners, find out their ‘risk currency’ (i.e. what they really care about) and develop a relationship of trust and reliable delivery.*” (CS1)

3.2. Local media-scientists collaboration

There is uncertainty as to how more formal ways of scientists-journalists collaborations could manifest beyond traditional approaches of journalists interviewing scientists on their research (OM1). This well-established approach has led to positive engagement on one hand by scientists who feel comfortable and sufficiently trained (either through in-house training or from experience) to participate in these interviews. On the other hand, some scientists may not think this is their role nor do they feel adequately trained or supported in order to navigate the complexities and at times, deceiving, interview methods adopted by the media. However it was suggested that “*an enthusiastic scientist could forge appropriate relationships*” and portray their science via local media through “*stories that have some local flavour, some local resonance*” and via “*open days, events, launches and personal briefings*” (LJ1) that can be facilitated by their academic institution. According to one scientist:

“Local scientists have an important potential role as the ‘honest brokers’ that interface between the global remoteness of most climate change issues and the ‘matters of concern’ that motivate individual communities and interest groups... they offer the opportunity of presenting a more familiar human face to the abstract and complex technical science that underlie policy initiatives” (GS1)

Similarly, university press offices play a significant, yet often unused role “*by setting up regular opportunities to meet scientists, inviting journalists onto campus to meet researchers and allowing them the chance to build a good working relationship*”. They were also seen to increase the capacity of scientists to engage with the public and media by “*provid[ing] advice, guidance and training to scientists and academics to help prepare them and give them confidence to speak to the media in a ‘media-friendly’ way*” (PO1). Engaging with media at the local level at an early stage in a scientist’s career “*presents a far more accessible and navigable entry into the rather scary world of the news*

media” where “they can make their mistakes and build their confidence outside of the full glare of national media attention, which many scientists fear will incur a loss of status with their peers” (GS1). This speaks directly to the issues discussed above relating to lack of training, skills or perceived ability of scientists to engage with the media. Embedding this within their career development and scientific training will enable them to forge strong relationships with local media, practice their media and public engagement skills and frame their research locally thus “building a greater level of trust and an open dialogue” (PO1). In so doing, they would later become known to local journalists who could then call upon them again when relevant stories require scientific statements or verification. As a result, they become well-known within a community for their research on their specialist subject, and “regular opportunities to be a commentator on key national and local issues will help build a rapport with local audiences” (PO1). In addition local scientists and media begin to better understand each other’s perspective where “scientists learn to talk in a language that ordinary people can easily understand [and] journalists learn to appreciate and deal with scientific uncertainties” (LJ2). This is crucial not only in ensuring sustained engagement with scientists but also in increasing the understanding of the ways in which scientists and journalists work and the challenges they face.

3.3. Challenges faced by local media and local scientists

Both scientists and media are restricted by the intrinsic nature of climate change which is “often presented as a global issue that lacks the granularity to be able to zoom in and see the projected impacts at a sub-national (say, county or city) level” (OM1) and hence limits the ability to frame it in a way that increases public salience locally. Climate science is also inherently complex and characterised by uncertainties (including projections of future climate at the local level), leading to “a huge degree of ambiguity that needs to be acknowledged and communicated” (GS1) which is where scientists can help “convey that technical uncertainty to non-specialists and to the media” (GS1), often a daunting and resource-intensive task. When it comes to the media, often local journalists lack science expertise, they “are unqualified to deal with complex science” (CS2) or need to overcome “the reluctance of commissioning editors and advertisers to address a subject which they regard as ‘toxic’” (CS1) and hence “they may not be tipped off about stories, and may not immediately see the local angle in national/international stories meaning local relevance of the international dimensions of climate change is not considered” (OM2). When it comes to climate change, the local media are tasked with communicating a complex, unappealing issue which is known to bring up negative feelings. They are required to convey this in a compelling way to increase readership but “if an issue is too complicated, or the public cannot understand the what and the why an issue or topic would affect them, or why they should care, then a journalists is going to struggle to make it interesting to them” (PO1). Media are faced with issues around a “disintegrating industry, collapse in advertising revenues, changes caused by digital publishing revolution, fewer journalists with less time, less pay, easily bored editors” (LJ2) which leads to stretched media outlets at the local level and a systemic challenge of ensuring the sound and accurate conveying of climate change to local levels within the realistic boundaries faced by local media: “The business model of national and local print media is broken, [with] repeated cycles of redundancy (...). It means the disappearance of specialist roles such as ‘science reporter’. This is the position in all newsrooms because of declining advertising and circulation revenues” (LJ1). This makes it particularly challenging for local media to navigate between the tensions they experience with their industry and the resource-intensive task of seeking to engage with local scientists in a way that ensures their final articles are scientifically accurate, publically appealing and satisfy their editor’s agendas.

Climate change is complex to convey across different scales and is often perceived as abstract and distant. Often, local scientists working on climate change, “will likely be working with national/international data/findings so will not often have a locally-relevant story to tell local media” (OM1) or “finding appropriate local examples may not always be easy” (OM2). And whilst the benefits of framing impacts and solutions to climate change locally are known (as discussed above), communicating this can be increasingly difficult when a scientist’s focus of research occurs at the national or international level, indeed ensuring scientific accuracy is maintained when scaling down their area of research may further limit their desire to attempt to do so. Local reporters are also often generalists, not specialists, and may not be familiar with methods through which to accurately convey research from local scientists, or may be unqualified to ascertain what a credible science story is (CS2). Once they have sufficient input to formulate their story, they may not be inclined or have the time to consult with the scientist again to conduct a final fact check. Institutional barriers may also exist that inhibit or restrict scientists from adequately engaging with local publics and media outlets as “the

university press office can be an obstacle in that they may prioritise engagement around specific university or scientific publications, or may steer towards national media for profile reasons” (OM2). And so, whilst press offices are there to support scientists in their engagement with the media, their own resource limitations and knowledge of what appeals at a given moment, nationally or locally, may not enable scientists’ research to be communicated via that channel in a consistent manner. Ultimately, “the climate horizon is just too far away for it to be of relevance to most people” (GS1) and it is “likely that research will have to compete with lots of other local issues that potentially have more relevance” (PO1) which calls for better framing of climate change aimed specifically at increasing salience of the issue at the local level.

4. Conclusions

Too little attention has been paid to the role of local media as a vehicle for increased engagement with climate change. An accumulating body of evidence suggests that public engagement needs to make climate change impacts and solutions locally relevant (Van der Linden et al., 2015), with local newspapers and radio being an important avenue of communication for older demographics.

Academics and particularly climate scientists are perceived as a trusted source; however, their lack of skill in explaining issues to a mainstream audience has affected public perception of their credibility (Rapley et al., 2014). Whilst academics are encouraged to engage with local and national media through their university press offices, the culture of the university system and the wider political economy means engagement beyond the academic community is an activity which, whilst valued, is difficult to achieve for those who are time poor and lack communication skills. Faculty structures, academic administrative roles and tenure processes can act as major obstacles.

Universities and research institutions are embedded in a community, particularly through their public outreach offices, enabling climate scientists a degree of automatic credibility with local media. However the approach to climate change taken by local media is generally not characterized by deep engagement, understanding or appreciation of the scientific consensus. Moreover, declining advertising and circulation revenues and cutbacks in staff have reduced the capacity of journalists to proactively cover the issues. Given the high staff turnover among reporters, scientists should particularly focus on cultivating working relationships with local editors who are more likely to be in post longer and shape the overall direction of the news output.

Such a collaborative relationship between local scientists and local media would, in future, provide opportunities to bring scientists and the media together to help identify and target societal responses needed to overcome specific climate impacts at the local level. In doing so, this would ultimately facilitate the exchange of information and provide better and timely access to data, evidence or expertise when needed as and when climate impacts become more relevant for local areas (Howarth, 2018). A sustained, transparent and reflective flow of information is needed to ensure scientists and local media are sharing and are up to date with the most recent knowledge on climate change and how a local area may be affected by its impact (or may indeed exacerbate these impacts), or contributing to its causes. This further ensures that certain barriers around lack of public understanding of climate change risks, desensitization, and reduced trust (Howarth and Monasterolo, 2016) are brought to the fore and addressed from the outset. This localized collaboration therefore tackles these challenges head on and can help re-frame them as opportunities to increase local salience of climate change. Consistent interaction, dialogue and collaboration between scientists and media at the local level is therefore required to ensure public engagement and awareness of climate change and risks reflects the most up to date scientific evidence (Nerlich et al., 2009; Whitmarsh & Corner, 2018; Howarth, 2018). However, we acknowledge that there are issues associated with this: building strong trusted relationships takes time as well as skills and an appetite for relationship-building which may be lacking; scientists and media will need to consider numerous other factors that may influence scientific communication/journalistic portrayals beyond climate change itself, and the two-way dialogue needed between scientists and the media is fraught with complexities.

We have discussed some of the key elements required to ensure trusted relationships can form between local media and local scientists in order to increase engagement and salience of climate change. Our pilot email survey was limited in scope, given that it was based on a small number of participants from UK-based individuals; however it provides important insights as to how these relationships need to evolve. Had we included more respondents, and from a variety of different countries, it is possible that we may have gained different insights. Further social science research needs to be undertaken to assess

the extent to which these views are widely held and explore these in greater detail in order to start creating the building blocks towards a more sustainable model of local science-media engagement on climate change. In addition, further research is required on (i) how scientists conduct their research and the challenges they face in communicating their findings in a compelling way to local non-expert audiences, and (ii) how the media operate on a day to day basis, their need for production of science-related articles framed at a local level, and where they see scientists fitting into this.

Despite the barriers and challenges outlined above, we argue that there are significant opportunities to improve this situation. Indeed, identifying these challenges provides clear indications as to how efforts should be prioritized in order to facilitate increased local salience to climate change through science-media collaboration. An emphasis on participatory approaches and dialogue is vital in science communication training and through media-science collaboration both scientists and journalists can gain a better understanding of the way in which the other operates. Similarly to the recommendation made above, more public engagement funding is required to facilitate local science-media relationships which have at their core, a proportion of funding allocated towards researching those interactions to ensure activities can be academically explored and feed into broader conversations about how to improve them. In addition, university press offices could do more to facilitate meaningful cultural exchange between local journalists and local climate scientists, leading each to a better appreciation of how they both operate. As one of the scientists we surveyed puts it:

“New ways of ‘seeing’ climate change need to be developed, with local publics in mind. Visioning the anticipated transformations in familiar local landscape and ecosystems seems one encouraging way to provoke wider attention, as are participatory approaches that involve the public in collaborative data-gathering exercises, but both of these are going to require scientists themselves to change the way they operate, and training courses in science communication to be more inclusive and reflexive in their outlook.” (GS1)

Local champion climate scientists, who are media savvy and possess high levels of credibility, could become key brokers in making the issues meaningful and understandable to local publics. This kind of local impact activity needs to be more valued and rewarded by academic institutions yet, currently there is a lack of recognition of the need for such roles and the value this would bring. Providing additional resource of this type, would enable the building, enriching, supporting and sustaining of long-term positive, constructive and mutually-beneficial collaboration between local scientists and local media/journalists. A two-way flow of information should help to remove scientists from their ivory tower and result in more engaging, informed and accessible coverage.

Acknowledgements

This work was supported by the Universities of Surrey and Plymouth. We would like to thank the interviewees and the anonymous reviewers whose comments helped shape the final version of this paper.

References

- Akerlof, K., Maibach, E.W., Fitzgerald, D., Ceden, A.Y., Neuman, A., (2013) Do people “personally experience” global warming, and if so how, and does it matter? *Global Environmental Change*, **23**, 81–91.
- Anderson, A. (2014) *Media, Environment and the Network Society*. Basingstoke: Palgrave.
- Anderson, A. (2009) Media, politics and climate change: Towards a new agenda, *Sociology Compass*, **3**(2): 166-82.
- Bloodhart, B., Maibach, E., Myers, T & Zhao, X. (2015) Local Climate Experts: The Influence of Local TV Weather Information on Climate Change Perceptions, *Plos ONE*, 10(11) <https://doi.org/10.1371/journal.pone.0141526>
- Brown, T., Budd, L., Bell, M., & Rendell, H. (2011). The local impact of global climate change: Reporting on landscape transformation and threatened identity in the English regional newspaper press. *Public Understanding of Science*, 20(5), 658-673.
- Brügger, A., Morton, T. A., & Dessai, S. (2016). “Proximising” climate change reconsidered: A construal level theory perspective. *Journal of Environmental Psychology*, **46**, 125-142

- Capstick, S.B. et al. (2015) Public perceptions of climate change in Britain following the winter 2013/2014 flooding. Understanding Risk Research Group Working Paper 15-01, Cardiff University, UK.
- Castell, S., Charlton, A., Clemence, M., Pettigrew, N., Pope, S., Quigley, A., Navin Shah, J., Silman, T. (2014) *Public Attitudes to Science 2014*. Ipsos MORI Social Research Institute. <https://www.britishecienceassociation.org/Handlers/Download.ashx?IDMF=276d302a-5fe8-4fc9-a9a3-26abfab35222>
- ComRes (2014) EICU Launch Survey Headline Findings http://eciu.net/assets/ECIU_Launch-Survey_Headline-Findings_4-August-2014-1.pdf
- Devine-Wright, P. (2013) Think global, act local? The relevance of place attachments and place identities in a climate changed world. *Global Environmental Change*, **23**, 61-69.
- European Broadcasting Union (2018) Trust in Traditional Media Increases Across Europe. <https://www.ebu.ch/news/2018/02/trust-in-traditional-media-increases-across-europe>
- Geiger, D., Swim, J.K., Fraser, J. (2017) Creating a climate for change: Interventions, efficacy and discussion about climate change. *Journal of Environmental Psychology*, **51**, 104-116
- Howarth, C. (2017) Telling stories on climate change and low carbon futures: Framing narratives around the UK's fifth Carbon Budget, *Journal of Energy Research and Social Science*, **31**, 295-302.
- Howarth, C. (2018) *Resilience to Climate Change: Communication, Collaboration and Co-production*. Palgrave Pivot Series
- Howarth, C. & Black, R. (2015) Local science and media engagement on climate change, *Nature Climate Change*, **5**, 506-508.
- Howarth, C. & Monasterolo, I. (2016) Understanding barriers to decision making in the UK energy-food-water nexus: The added value of interdisciplinary approaches. *Env. Science & Policy*, **61**, 53-60.
- Howarth, C. & Painter, J. (2016) The IPCC and local decision making on climate change: a robust science-policy interface? *Palgrave Communications*, **2:16058**, doi: 10.1057/palcomms.2016.58
- Jacobs, R., Howarth, C. & Coulton, P. (2017) Perspectives on scale: art/science collaborations across the local and global. *Intal Jnl Clim Chge: Imp & Resp.* **9(3)**, 1-9
- Kalhoefer, K. (2017) How Broadcast Networks Covered Climate Change in 2016. Media Matters, <https://www.mediamatters.org/research/2017/03/23/how-broadcast-networks-covered-climate-change-2016/215718>
- Latour, B. (2004) 'Why has critique run out of steam? From matters of fact to matters of concern,' *Critical Inquiry*, 30: 225-248.
- Lester, L., & Cottle, S. (2009) Visualizing climate change: Television news and ecological citizenship. *International Journal of Communication*, 3: 920-936.
- Maibach, E. (2018) Feature: Reducing the Obstacles to Science-based Local Climate Reporting, SEJ, March 21st. <https://www.sej.org/publications/features/reducing-obstacles-science-based-local-climate-reporting>
- Maibach, E., Craig, R.T., Yagatchi, W.A., Murphy, J., Patzer, S.M. & Timm, K.F.M. (2018) Climate Matters in the Newsroom: Society of Environmental Journalists Member Survey, 2018. <https://www.sej.org/sites/default/files/CMN-SurveyReport-Mar2018.pdf>
- Maibach, E., Woods Placky, B., Witte, J., Seitter, K., Gardiner, N., Myers, T., Sublette, S., & H. Cullen (2016) TV meteorologists as local climate change educators. *Oxford Encyclopaedia of Climate Science*.
- Matsa, C. (2018) Fewer Americans rely on TV news; what type they watch varies by who they are. Pew Research Center, 5th January.
- Nerlich, B., Koteyko, N., Brown, B. (2009) Theory and language of climate change communication. *Wires Climate Change*, <https://doi.org/10.1002/wcc.2>
- Nielsen, R. K. (2015) Introduction in Nielsen, R. K. (ed.) *Local Journalism: The Decline of Newspapers and the Rise of Digital Media*. Oxford: I.B. Taurus
- Porter, J.J., Demeritt, D., Dessai, S. (2014) The right stuff? Informing adaptation to climate change in British Local Government. *Global Environmental Change*, **35**, 411-422.
- Project for Improved Environmental Coverage PIEC (2015). Trends in Visibility of Environmental Issues in the U.S. News Media.
- Project for Improved Environmental Coverage PIEC (2014). Environmental Coverage in Mainstream Media: We Need More. <http://greeningthemedial.org/wp-content/uploads/PIEC-Trends-Report.pdf>

- Rapley, C., de Meyer, K., Carney, J., Howarth, C., Clarke, R., Smith, N., Stilgoe, J., Youngs, S. (2014) *Time for a change? Climate Science Reconsidered*. Report of the UCL Policy Commission on Communicating Climate Science.
- Reuters Institute Digital News Report (2017)
https://reutersinstitute.politics.ox.ac.uk/sites/default/files/Digital%20News%20Report%202017%20web_0.pdf
- RCUK (2010) *Concordat for Engaging the Public with Research*. Research Councils UK.
- Newman, N., Fletcher, R., Kalogeropoulos, A., Levy, D., Nielsen, R. (2017) *Reuters Institute Digital News Report 2017*. Reuters Institute & University Oxford
https://reutersinstitute.politics.ox.ac.uk/sites/default/files/Digital%20News%20Report%202017%20web_0.pdf
- Scannell, L., & Gifford, R. (2013) Personally relevant climate change: The role of place attachment and local versus global message framing in engagement. *Environment and Behavior*, 45(1), 60-82.
- Schäfer, M.S. & Schlichting, I. (2014) Media representations of climate change: A meta-analysis of the research field, *Environmental Communication*, 8 (2), 146-160.
- Schiermeier, Q. (2018) Droughts, heatwaves and floods: How to tell when climate change is to blame. *Nature*, 30th July.
- SEJ (2018) *Survey: Climate Change News Coverage Needs More Support To Thrive, March 19th*.
<https://www.sej.org/publications/sej-news/survey-climate-change-news-coverage-needs-more-support-thrive>
- Shuckburgh, E., Robison, R., & Pidgeon, N. (2012) Climate science, the public and the news media: Summary findings of a survey and focus groups conducted in the UK in March 2011. Living With Environmental Change, Swindon, UK
- Sheppard, A. Shaw, D. Flanders, S. Burch, et al. (2011) Future visioning of local climate change: a framework for community engagement and planning with scenarios and visualization, *Futures*, 43, 400–412.
- Sherman-Morris, K. (2005) Tornadoes, television and trust—A closer look at the influence of the local weathercaster during severe weather, *Environ. Hazards*, 6, 201–210.
- Statista (2018) Level of trust in national/local news in the U.S. 2018
<https://www.statista.com/statistics/707507/national-local-news-trust/>
- Tobitt, C. (2018) Local newspapers seeing ‘resurgence of trust’ as research shows they are three times more trusted than Facebook. *Press Gazette*, 1st March.
- Van der Linden, S., Maibach, E., Leiserowitz, A. (2015) Improving public engagement with climate change: Five ‘Best practice’ insights from psychological science. *Persp. Psych. Sc.* 10, 758-763.
- van Vuuren, K., Angus, D. and Ward, S. (2014) Clean energy futures and place-based responses: A comparison of letters-to-the-editor in two Australian regions, *Communication, Politics and Culture*, 47(2), 17-34.
- Whitmarsh, L. and Corner, A. (2018) Tools for a new climate conversation: A mixed-methods study of language for public engagement across the political spectrum. *Global Environmental Change*, 42, 122-135
- Wihbey, J. and Ward, B. (2016) *Communicating About Climate Change with Journalists and Media Producers*. Oxford Research Encyclopedia of Climate Science.
- YouGov (2018) Local Press Most Trusted Source for Local News.
<http://www.localmediauk.org/News/yougov-local-press-most-trusted-source-for-local-news>
- Zhao, X et al. (2014) Climate change education through TV weathercasts: Results of a field experiment, *Bull. Amer. Meteor. Soc.*, 95, 117–130.